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Montana Cooperative Wildlife Research Unit

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USDI Fish and Wildlife Service, University of
Montana, and Wildlife Management Institute
cooperating.

ANNUAL REPORT -- FY 1988

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Cover--Habitat use by elk in the high meadows of eastcentral Idaho seemed to be little affected by the presence of cattle. Both species were attracted to mesic areas where sedges provide high-quality forage.

Photo by Bart O'Gara



Cow elk were radio collared in corral traps during winter to study their habitat use, distribution, and nutritional condition. When elk predictably gather on a winter range, such corral traps, baited with alfalfa hay, are an efficient way to catch them.

Photo by John Craighead

ANNUAL REPORT

of the

MONTANA COOPERATIVE WILDLIFE RESEARCH UNIT

University of Montana

Missoula, Montana

to

UNIVERSITY OF MONTANA

MONTANA DEPARTMENT OF FISH, WILDLIFE AND PARKS

WILDLIFE MANAGEMENT INSTITUTE

U.S. FISH AND WILDLIFE SERVICE, DEPARTMENT OF THE INTERIOR

Volume 5

October 1987-September 1988

Respectfully submitted,


Bart W. O'Gara, Leader


Joe Ball, Ass't. Leader

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Chris Servheen removing an immobilizing dart from a 500-pound grizzly bear in the Mission Mountains, Montana. This study resulted in a recognition of the fragile nature of the Mission Mountain grizzly population and its use of low elevation habitats near people.

Photo by Robert Klaver

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MONTANA COOPERATIVE WILDLIFE
RESEARCH UNIT PERSONNEL

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Michael Jackson
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Amy Johnston
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Victoria Kurnat
Chris Loggers
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Kuenhi Tsai
Peggy Wallgren
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COOPERATING AGENCIES

University of Montana
Montana Department of Fish, Wildlife and Parks
Wildlife Management Institute
U.S. Fish and Wildlife Service

American Forest Foundation
British Columbia Wildlife Branch, University of British Columbia
Battelle, Pacific Northwest Laboratories
Bonneville Power Administration
Bureau of Indian Affairs
Confederated Salish and Kootenai Tribes
Davis, J. E.
Department of Forestry, Baluchistan
Fish and Wildlife Foundation
Frankfurt Zoological Society
Institute of Biology, National Taiwan Normal
International Snow Leopard Trust
Michael Murphy Foundation
Moroccan Department of Waters and Forests
Nebraska Game and Parks Commission
Northwest College and University Association for Science
Pakistan Forest Institute
Plum Creek Timber Company
Simon Fraser University
Shell Oil Company, Canada
U.S. Department of Energy
U.S. Fish and Wildlife Service
 Alaska Fish and Wildlife Research Center
 Bowdoin NWR
 Charles M. Russell NWR
 Division of Refuges
 Grizzly Bear Recovery Coordination Office
 Lee Metcalf NWR
 Migratory Bird Management Office
 National Bison Range
 Northern Prairie Wildlife Research Center
 Office of International Affairs
 Pacific/Hawaiian Islands NWR
U.S. Forest Service
 Kootenai and Lolo national forests
 Intermountain Research Station, Forest Sciences Laboratory
 Montana Forest and Conservation Experiment Station
U.S. National Park Service
 Glacier and Yellowstone parks
U.S. Peace Corps
Western Plateau Institute, Academia Sinica
Zoological Survey of Pakistan

PERSONNEL NOTES

The first Leader of the Montana Cooperative Wildlife Research Unit, E. L. Cheatum, died 10 February 1988, at Watkinsville, Georgia. He was 78 years old at time of death. E. L., as he was commonly known, served with the New York State Conservation Department from 1939 to 1968, with years 1950-1952 out to start the Montana Unit. In 1968 he went to Athens, Georgia, to form the University of Georgia's Institute of Natural Resources. After retiring in 1976, he served on the nuclear plant licensing board of the Nuclear Regulatory Commission. Dr. Cheatum was awarded a Bronze Star for his service in the Pacific Theater during World War II.

The following personnel joined the Unit on nongraduate student appointments of varying length:

Canada Duck Banding and NPWRC Prairie Duck Production

Mark Albrecht
Chris Dwyer
Erich Gilbert
Kay Harris
Anthony Hawkes
Keith Kalvik

Steven Pitschka
Gregory Risdahl
Susan Ross
Robert Sanders
William Seybold
Wally Shamanski

CSKT-BPA Goose Studies

Ken Clairmont
Shari Gregory
Dennis Mackey

Bill Matthews
Kathy O'Connor
Bill Swaney

BIA-Kerr Dam Wildlife Studies

Dale Becker
Andrea Easter-Pilcher
Rosemary Leach
Curtis Mack

Pat Mullen
Art Soukkala
John Waller

Other Field Studies

Susan Ball
Rebecca Brown (V-S)
Joel Carlson
Sarah Griffin
Paul Hendricks
Therese Jackson (V-S)
Gloria Jakubco (V-S)
Steve Johnsen (V-S)
Darren Johnson (V-S)
Lisa Joyal

Don Katnik (V-S)
Andrea Kirn (V-S)
Jeffrey Marks
Tim Monzon (V-S)
Sally Olson-Edge
Catherine Phillips
Mark Roy (V-S)
Eric Schmidt (V-S)
Richard Sherwood (V-S)
Kelly Smith-Morrow (V-S)
Dan Svingen

(V-S) = Volunteer with subsistence allowance.
All others are paid positions.

YCC and Work Study Students

Susan Deckert
Brian Hensel
Hank Huigen

Darren Johnson
Tom Radandt
Tarn Ream



Unit personnel and students help the U.S. Fish and Wildlife Service and the Montana Department of Fish, Wildlife and Parks trap and transplant Rocky Mountain sheep and goats during 1988.

Photo by Steve Brockman

ABSTRACT

Bown, Robin R., M.S., 1988

Wildlife Biology

Beaver Habitat Along Rivers and Reservoirs in Central Montana (116 pp.)

Director: B. W. O'Gara

This study was initiated in 1982 as part of the mitigation studies for a proposed hydroelectric dam in central Montana, with the goal of determining the effects of run-of-the-river impoundments on beaver and developing potential mitigation strategies. The study areas were the Missouri River at Carter Ferry, Lake Elwell on the Marias River, and the Marias River below Lake Elwell.

At Carter Ferry, beaver use was associated with islands or backwaters, water depths at 1 m from shore of 1.5 dm or less, adjacent river channels of 70 m or less, non-cliff uplands, or the presence of woody vegetation. On the Marias River, beaver used islands or sites with shrubs. At Lake Elwell, beaver used sites with slopes of 19% or less, non-cliff uplands, or the presence of shrubs.

Lodges at Carter Ferry were associated with flat banks, soil substrates, or nearby shrubs. On the Marias River, beaver built lodges on non-cliff sites with soil substrates or greater than 10% underwater slope. At Lake Elwell, lodges were associated with bank aspects of 90 to 210 degrees, soil underwater substrates, or deep water near shore.

Seventy-two percent of the shrub cutting by beaver occurred in the fall. Within each size class, beaver cut shrubs as close to the water as available. Cottonwood trees were cut more often than expected while other species, except chokecherry, were cut less often than expected. The cut cottonwoods were smaller than average and further from shore than expected.

Colony densities on the Missouri River varied from 0.03 to 0.31 per kilometer of shoreline. The Marias River below Lake Elwell varied from 0.10 to 0.23 colonies per kilometer. Lake Elwell averaged 0.18 colonies per shoreline kilometer while the Missouri River reservoirs ranged from no colonies to 0.17 per kilometer. Caches were located on islands more often than expected and steep mainland banks less often than expected.

Potential mitigation strategies include replanting vegetation on flat or terraced banks; controlling water fluctuations on the entire reservoir or small segments of reservoirs using subimpoundments; controlling the timing and magnitude of downstream fluctuations; and protecting banks with erosion problems through structures or barrier islands.

ABSTRACT

Costain, Brent, M.S., 1988

Wildlife Biology

Population Status and Habitat Use Patterns of Shiras Moose in the Yaak River Country of Northwest Montana

Director: L. H. Metzgar

Most uncanopied foraging habitat for Shiras Moose (Alces alces shirasi) in the Yaak River drainage has been created by commercial logging. Field investigations, 1984-86, explored the influence of timber management, hunting, and human activities on moose habitat selection, movements, and population trends. Most data were derived from tracking and observation of 8 radio-collared moose. Habitat selection was examined through use-availability analysis of 48 field-measured parameters at 400 radio and 188 random locations. Home ranges were defined by radio points and sightings within minimum convex polygons and 99% harmonic isolines. Population size and structure were estimated from non-radio assisted sightings and the ratios of marked-total animals.

Uncanopied habitats with abundant high quality forage and good hiding cover were important to moose during all seasons. Forested cover was important during summer heat and deep winter snow, and aquatic sites were important in summer. Key habitat components for moose were: secure calving areas, aquatic feeding sites, damp timbered bottoms on summer range, mosaics of timber and browse on low-elevation winter range, and secure uncanopied foraging areas at middle and higher elevations. Moose occupied low-elevation habitats during periods of deep winter snow and while using aquatic feeding sites on the Yaak River in summer, but otherwise selected middle and higher elevations. In summer and fall, moose used both coarse and fine-grained mosaics of uncanopied browse and timbered cover. During deep-snow winters, they minimized energy loss by restricting activity and by selecting for low-elevation timber stands with adequate internal forage or abundant edge. During light-snow winters, they maximized energy intake by selecting for good quality browse habitats in 12 to 30-year-old cutting units at low to middle elevation.

Moose populations in this portion of the Yaak drainage are not increasing over the long term, in spite of low natural adult mortality, high calf production in some years, high winter calf survival, and good browse condition. The combined effect of legal and illegal hunting appears to be the principal limiting factor.

Principal management direction involves: maintaining and enhancing the integrity of key components, pursuing a vigorous road closure program, designing irregular cutting units that maximize immediately available hiding cover, creating more low-elevation mosaics of timbered cover and open browse.

ABSTRACT

Kratville, Sandra P., M.S., 1988

Wildlife Biology

Elk Habitat Selection, Distribution, and Nutrition as Influenced by Cattle in East-Central Idaho

Director: B. W. O'Gara

Elk (Cervus elaphus nelsoni) habitat use, distribution, and nutritional condition, as affected by cattle, were investigated in east-central Idaho from January 1985 through December 1986. Aerial surveys resulted in 720 radio-marked elk locations during the 2 years. Habitat parameters measured from mapped summer-fall locations were compared to habitat parameters measured from random locations. Elk use and selection of habitat parameters were similar in pastures of cattle grazing allotments to elk use and selection in non-pasture areas. The extent to which cattle influenced elk habitat use and selection was undetermined because some differences were attributed to a natural shift in elk use to the non-pasture area during late summer and fall and to vegetation differences between pastures and non-pasture areas.

Elk distribution on summer-fall range was similar during both years regardless of cattle distribution on pastures. However, elk preferred a rested pasture when compared to a pasture grazed by cattle. Of the two pastures most used by elk, a preference was shown for whichever pasture was ungrazed by cattle during the early cattle grazing season. Elk preferred to use a pasture occupied by cattle late in the cattle grazing season rather than an unoccupied pasture which had been grazed earlier in the season.

Pellet collections were conducted from June 1985 through December 1986. The level of diaminopimelic acid (DAPA) in the fecal dry matter was determined through chemical analysis in an effort to estimate dietary quality and animal nutritional condition. DAPA levels were highest during spring and lowest during winter, reflecting the annual cyclic pattern expected in forage quality. Comparison of DAPA levels from pellets collected in areas grazed by cattle to areas ungrazed by cattle suggested dietary quality for elk was unaffected by cattle grazing. Because a specific correlation between DAPA and digestible energy has not yet been established for elk, and because basic assumptions of this method have not been adequately verified, results concerning the nutritional condition of elk using this method are inconclusive.



Young woman and three children in Ladakh, the highest inhabited territory in India. The rock walls are used as pens for domestic stock, and snow leopards sometimes enter those pens to kill goats or sheep.

Photo by Joseph L. Fox

Completion Report--India Mountain Project

J. Fox, S. P. Sinba, R. Singh, and P. Das

During November 1985 through July 1986, a survey of the presence and ecology of the endangered snow leopard and its major prey was conducted in selected areas of three states in northwest India. The study was carried out under the auspices of the Wildlife Institute of India (Government of India, Department of Forests and Wildlife), in cooperation with the U.S. Fish and Wildlife Service and the International Snow Leopard Trust. Additional support was supplied through grants from World Wildlife Fund-U.S., Chicago Zoological Society, and the National Wildlife Federation.

Snow leopard sign was found to be most abundant in the trans-Himalayan areas of central Ladakh, less so in the Himalayan crest region of southern Ladakh, and least abundant on the southern side of the Himalayas. More than 100 km of individual snow leopard tracks were followed in Ladakh, showing snow leopard habitat use to be closely associated with sharp breaks in terrain such as cliffs and river bluffs. Blue sheep and ibex were the most common large ungulate prey species of snow leopard in the Ladakh region, and healthy populations were found in some areas. Wolves and brown bears present competition for the snow leopard in some regions, however, the snow leopard's primary mortality factor appears to be their killing by humans in retaliation for predation on livestock.

The surveys were conducted in proposed or existing National Parks and Wildlife Sanctuaries, and the results will be used in formulating recommendations for conservation site location and management in those areas. As a result of this project, the State of Jammu and Kashmir has initiated a snow leopard recovery program with the creation or expansion of three new national parks in the northern part of the state where there is potential for conserving viable populations of this endangered species.



Completion Report--Canada Goose Nesting and Broodrearing in
Relation to Water Levels in the Flathead Valley

I. J. Ball and J. J. Claar

Kerr Hydroelectric Dam is located at the south end of Flathead Lake, controls water levels on the lake and the Flathead River below the dam, and is currently operated as a load control facility. Dam operations, and subsequent water levels, are primarily affected by electric power production, recreational constraints on lake levels, and operation of Hungry Horse Dam located on the South Fork of the Flathead River. Current operation of Kerr Dam creates the greatest yearly water level fluctuations on both the lake and river during the Canada goose (Branta canadensis hoffitti) brood and nesting period. Data collected from 1980-82 indicated that goose nest numbers on the river were lower than during the 1950's, and that brood habitat on the lake may be limiting the goose population there.

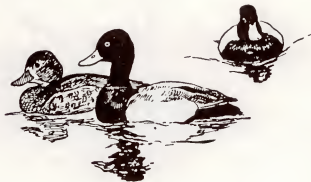
Our study was conducted from 1983-87 to determine the effects of Kerr Dam operation on Canada goose populations and habitat on the south half of Flathead Lake and the Flathead River, and to formulate management and mitigation recommendations. Historical losses of habitat on the lake and river were documented. Nesting geese on the river appeared to be negatively affected by a lack of nest sites free from predators, and responded to available artificial nest structures with an increase in nest numbers and nesting success. Under current dam operation, river channel depths and widths do not discourage access to nesting islands by mammalian predators during some years, and high predation on ground nests occurs. The river ground-nesting goose population maintains itself at a low level, but is unable to increase because of high predation rates. Ground-nesting geese on the river used sites on small islands or along the edge of large islands, with abundant cover surrounding the nest. Intensively used brood areas on the lake and river were identified and described. Brood habitat on the lake was lower in quality and quantity than on the river due to dam operations. Gosling mortality on the lake was high, almost 2 times higher than on the river. Lake broods expended more energy obtaining food than river broods. When goslings were young and the lake level low, broods were forced to forage on sparsely vegetated mudflats because they would not cross the extensive mudflats to feed in upland pastures. Losses of brood habitat in the form of wet meadow marshes were documented and mitigation options developed. Management/mitigation alternatives and monitoring methods for nesting and brooding geese were identified.



Completion Report--Potentials for Duck Production on Western
Grazing Lands

I. J. Ball, S. K. Ball, and R. L. Eng

Density and productivity of breeding ducks was measured on man-made stock ponds located on blocks of grazing land in northcentral Montana. Seven study blocks totalling 200 km² were surveyed repeatedly during April-July of 1987 for breeding pairs and broods, with productivity measured as number of broods/100 indicated pairs. We avoided areas with large (>5 ha) wetlands, natural potholes with dense emergent vegetation, streams, and dense concentrations of wetlands; this approach maximized accuracy of pair and brood counts and minimized problems of ingress or egress, but also probably excluded many of the areas that were most attractive to breeding ducks. Upland cover on most blocks was poor by conventional standards, consisting primarily of sparse, short (<20 cm) grasses, cactus, and club moss, with the only substantial residual cover provided by sparse scattered patches of sage. Density of breeding ducks averaged 8.5 pairs per hectare of water. Overall species composition of pairs was: American Wigeon (19%), Mallard (14%), Northern Pintail (13%), Gadwall (13%), Lesser Scaup (13%), Blue-winged/Cinnamon Teal (10%), Northern Shoveler (9%), Green-winged Teal (4%), and other divers (5%). Productivity of dabbling ducks averaged 48.1 broods per 100 indicated pairs. This is a conservative estimate because pair counts were not adjusted for sex ratio bias and because a few broods (especially mallards and pintails) were probably missed during surveys. Declining densities of breeding ducks and perilously low nest success are cause for grave concern about the future of breeding duck populations in much of the prairie pothole region. The potential for duck production on stock dams in northcentral Montana is extremely high, and similar high potential exists over an immense, but unknown, geographical area of the West. Full development of this potential will require a break from traditional thought about the essential characteristics of duck production habitat.





Uncanaopied habitats with abundant high-quality forage were important to moose during a study in northwestern Montana. Aquatic feeding sites were important during summer, but forested cover was important during summer heat and deep winter snow.

Photo by Bart O'Gara

RESEARCH PROJECTS

Physiologic and Ecologic Studies of the Pronghorn (*Antilocapra americana*)

Project Leader: B. W. O'Gara

Cooperators: National Bison Range, U.S. Fish and Wildlife Service; Montana Department of Fish, Wildlife and Parks; and the Wildlife Management Institute

Objectives:

To study:

1. the reproductive physiology of male and female pronghorn;
2. the physiology and function of scent glands;
3. food habits related to changes in range conditions;
4. horn growth and casting; and
5. the relationships of pronghorns to other artiodactyls.

Results:

Twelve chapters are in press in two books. When they are published, this project will be terminated.

Duck Banding in Canada

Project Leader: I. J. Ball

Student Technicians: Varies, 4 to 6 annually

Cooperators: USFWS, Migratory Bird Management Office

Objectives:

1. Trap and band 2000 mallards and up to 1500 pintails and 1000 of each of the other species available. This quota will be sought at each of 10 banding stations.
2. Maintain accurate records and provide summary reports from each station to the Migratory Bird Management Office.
3. Provide students from the Montana Cooperative Wildlife Research Unit with training in waterfowl research techniques and an ecological perspective that can only be obtained through on-the-ground experience.

Results:

Vary annually. Detailed annual reports are available. The Unit will be unable to participate in this work using Research Work Orders in the future. We do hope to develop some mechanism that allows continued participation by our students.

Nest Success of Upland-Nesting Ducks
in the Flathead Valley

Project Leader: I. J. Ball
Student Investigator: N. Hall
Cooperators: USFWS, National Bison Range; Montana
Department of Fish, Wildlife and Parks

Objectives:

1. Document nest success and, where possible, causes of nest failure on both removal and nonremoval areas.
2. Evaluate costs and benefits of skunk removal.
3. Attempt to quantify the relative importance of pair habitat; size, type, and condition of cover; and the presence or absence of predators.
4. Submit management recommendations.

Results:

Baseline data collected during 1986 and 1987 suggest that nest predation was a serious problem for ducks in the Flathead Valley. Skunk removal was initiated this year on the study area, and 109 skunks were taken. A total of 675 acres was searched twice this year between 3 May and 13 July on the removal area, and 114 nests were found. Nest success on the removal area (18.5%) did not change significantly from the nest success found last year (20.7%). A total of 250 acres off of the removal area was searched twice during the same time period. Only 17 nests were located, too few for estimating nest success. Further data analysis and revisions of the study plan are underway. The second field season will begin in May 1989.

Pheasant Nesting Success in the
Flathead Valley, Montana

Project Leaders: I. J. Ball and B. W. O'Gara
Student Investigator: K. Tsai
Cooperators: Montana Department of Fish, Wildlife and Parks;
Bureau of Indian Affairs, Confederated Salish
and Kootenai Tribes; USFWS, National Bison
Range

Objectives:

1. Determine nesting success.
2. Determine the impact of skunk removal on nesting success.
3. Identify cover types in which hatching success is highest.
4. Submit management recommendations.

Results:

Field work was completed on 15 July, and 86 nests were found this year. Preliminary analysis indicates nest success increased to 42% after removal of skunks, but it is not a significant difference from that of 1987, which was about 35%. Discriminant Function Analysis is being used to determine the characteristics of habitats. This thesis should be finished by November.

Density Effects in Reproduction in the Striped Skunk

Project Leaders: I. J. Ball and K. Foresman

Student Investigator: D. Pengeroth

Cooperator: USFWS, National Bison Range

Objectives:

1. Determine the effects of density in the reproductive performance of the striped skunk.
2. Describe the reproductive characteristics of a striped skunk population in western Montana.

Results:

A predator removal program was initiated in 1988. The striped skunk had been identified as key predator on waterfowl production areas and was removed to improve nest success. This afforded the opportunity to obtain quantifiable data on the reproductive history of the striped skunk and to test for density effects in reproduction.

A total of 109 skunks were captured from 7 April through 19 July 1988, 56 of which were adult pregnant females as determined by presence of fetuses. The majority of skunks were found in habitat classified as dense nesting cover and along irrigation ditches. Skunks will be removed again in 1989. Laboratory analysis will determine reproductive efforts between years.



River Otter Population Status and Habitat
Selection in Northwestern Montana

Project Leader: L. Metzgar

Student Investigator: A. E. Dronkert

Cooperators: Montana Department of Fish, Wildlife and Parks

Objectives:

1. Document the distribution of river otters on northwest Montana waterways.
2. Identify and map habitat for otters on northwest Montana waterways.
3. Quantify habitats used by otters in the Flathead River above Flathead Lake and compare with habitat availability in this area.
4. Determine otter population size in the study area.
5. Model the effects of harvest on river otters in the study area.

Results:

Five river otters were captured in the Flathead River study area and implanted with radio transmitters and radioisotope markers during fall 1986; 250 independent radiolocations were obtained from November 1986 to June 1987. Radiolocations were obtained throughout the 24-hour day. Locations are being analyzed to determine fall, winter, and spring habitat use, daily movements and activity, and home range. Habitat availability was determined by stratified random sampling of the area used by the study animals. Forty latrines were repeatedly sampled for scat deposition. Habitat characteristics adjacent to latrine sites were measured. These data are currently being analyzed using multivariate as well as univariate statistical methods. Scats ($N = 361$) were scanned using three different radioisotope detectors but failed to show evidence of radioactivity. As a result, objective 4 will probably not be met although other information will be used to obtain a population size estimate. Scats will be investigated for prey remains. Data analysis and thesis writing will continue through winter 1988. The student investigator has been hired by the U.S. Forest Service but plans to complete her thesis by March 1989.



Wildlife Conservation and Management Training
Program, Peshawar, Pakistan

Project Leader: B. W. O'Gara

Personnel: L. Metzgar and R. Greene

Cooperators: Pakistan Forest Institute; Zoological Survey of Pakistan; U.S. Fish and Wildlife Service, Office of International Affairs; Department of Forestry, Baluchistan

Results:

This project is on hold, and may be cancelled, because of the political situation in Pakistan.

Ecology of Bald Eagles Wintering Along the
Columbia River in South-Central Washington

Project Leaders: I. J. Ball and B. R. McClelland

Student Investigator: S. A. Eisner

Cooperators: Northwest College and University Association for Science; U.S. Department of Energy; and Battelle, Pacific Northwest Labs

Objectives:

1. Determine the combination of environmental factors that best explains bald eagle distribution along a 136-km stretch of the Columbia River between the Tri-Cities and Wanapum Dam. Compare diurnal and nocturnal distribution on the Hanford portion of this stretch.
2. Summarize perch use over the entire study area and for perch trees on the Hanford Reach, characterize individual trees and tree clumps used for diurnal and nocturnal perches and compare with trees not used.
3. Describe and quantify communal night roost behavior.

Results:

A draft of the thesis is complete, and is undergoing review.

Establishment, Funding, and Execution of a
Sister Institution Agreement Between
The Northwest Plateau Institute and University of Montana

Project Leaders: B. W. O'Gara, R. C. Murray, and D. M. Murphy

Student Investigators: To be assigned

Cooperator: Michael Murphy Foundation

Objectives:

- To negotiate and execute a sister institution agreement that will:
1. provide research opportunities in Qinghai Province, China, for University of Montana Ph.D. candidates;
 2. provide research and training opportunities for Chinese students at University of Montana to facilitate better wildlife management in Qinghai Province;
 3. broaden the scope of experience of University of Montana graduate students and professors and of NWPI graduate students and professors; and
 4. directly aid Chinese biologists in planning, research, and management regarding wildlife resources in western China.

Results:

Two American Ph.D. candidates have visited their potential study areas and are preparing research proposals. Research will not begin before July 1989. A visiting scholar from the Northwest Plateau Institute will spend the academic year 1988-89 at University of Montana.

Nesting Structures for Mallards and Canada Geese: a Handbook

Project Leader: I. J. Ball

Research Assistant: S. K. Ball

Research Cooperator: F. B. Lee

Cooperators: USFWS: Division of Refuges, Region 6,
Region 4, and CUC Extension

Objective:

Produce a practical handbook on the use of waterfowl nesting structures that will allow managers to make informed decisions about structure design and placement that will maximize effectiveness, durability, aesthetic appeal, and nest security, and minimize construction and maintenance costs.

Results:

A draft of the handbook is complete and is undergoing review.



River Otter Habitat Use in
Northwest Montana

Project Leaders: L. Metzgar

Student Investigator: A. Johnston

Cooperator: Montana Department of Fish, Wildlife & Parks

Objectives:

1. Evaluate the use of sign surveys for indicating river otter habitat through discriminant comparisons of latrine site and non-latrine site radio locations.
2. Identify habitat components of significance to river otters within seasonal home ranges through discriminant comparisons of radiolocations and random sites.
3. Refine survey techniques to document the distribution of river otters in northwest Montana.

Results:

Full-time fieldwork was initiated in July 1987 and will continue through December 1988. Three radio-instrumented river otters captured by the preceding student investigator remained in the Flathead River at the onset of this project. Five additional otters were live-trapped and equipped with radio transmitters during October and November 1987. Radiolocations are being obtained for each otter every 3 days.

Random latrine site surveys were conducted along the banks of the Flathead River during January and February 1988. Radiolocations and random sites are being searched for the presence of river otter scat. Latrine sites are being characterized and scat samples collected for analysis. Riparian and aquatic habitat variables are being measured at radiolocations and random sites.

The student investigator will begin full-time data analysis and manuscript preparation in January 1989 and complete the thesis by July 1989.

Beaver Dispersal in Northwestern Montana

Project Leaders: L. Metzgar and D. Pletscher
Student Investigator: M. Jackson
Cooperator: Montana Department of Fish, Wildlife &
Parks; Lolo National Forest

Objectives:

1. Quantify survivorship of dispersers and direction and distance of beaver dispersal in selected drainages in northwestern Montana.
2. Survey selected drainages to delineate experimental areas and determine the availability of habitat for dispersing beavers.
3. Gather supplemental data on age, sex, and productivity of beaver populations within the selected study areas.

Results:

Fieldwork begun in July 1987 resulted in the selection of four drainages in northwestern Montana that represent both primary and secondary habitat for beaver. Livetrapping was initiated in September of 1987. To date, 46 beaver have been trapped. Each beaver was eartagged and tattooed on the webbing of the hindfoot. Sex was determined by cloacal examination and various morphological measurements were taken to determine age class.

A total of 12 fall-trapped yearlings and spring-trapped 2-year-olds have been instrumented. Radiolocations were made throughout the spring and summer. Of the beaver initially instrumented, three were killed by black bears and two died of complications from surgery and transport. The remaining seven continue to be monitored. Continuing fieldwork consists of ongoing livetrapping and the monitoring of transmitter-equipped beaver.

Fieldwork will be completed for the initial phase of this project in December. Spring livetrapping and continued radio monitoring will be conducted during the next phase by a new student investigator. Thesis completion for this initial phase is expected for July 1989.



Black Bear Ecology and Observability Rates
in the Yaak River Drainage, Montana

Project Leader: B. W. O'Gara
Student Investigator: T. J. Thier
Cooperators: Montana Department of Fish, Wildlife, and
Parks; J. E. Davis; Kootenai National Forest

Objectives:

1. Determine the age and sex structure of a study area population.
2. Determine home range sizes of adult black bears of both sexes.
3. Determine bear densities in the study area.
4. Determine age specific survival rates and mortality rates.
5. Determine reproductive rates in the population.

Results:

Instrumented bears were intensively monitored until all had denned in late November of 1987. Sporadic locations and hunter-kill information is still being gathered in 1988 that may be incorporated into the thesis. Three marked bears were known to have been killed by hunters during the spring 1988 hunting season. Thirteen of 25 marked bears are known to have been killed by hunters within 2 years of being marked. Reproduction for 1988 is believed better than for 1986 or 1987, with one of the marked females producing three cubs. An examination of the mark-recapture data indicates a study area density of 1 bear per 17 km² for 1986. The home range data have not yet been thoroughly analyzed. Completion of the thesis is expected during Winter Quarter of 1989.

Effects of Motorized Road Use on Grizzly Bear
Behavior, Habitat Use, and Reproductive Success

Project Leader: C. Servheen
Technicians: B. N. McLellan
T. Radandt
F. Hovey
Cooperators: U.S. Fish and Wildlife Service, Region 6,
Grizzly Bear Recovery Coordination Office;
British Columbia Wildlife Branch,
The University of British Columbia;
Simon Fraser University;
The Fish and Wildlife Foundation;
Plum Creek Timber Company;
The American Forest Foundation;
Shell Oil Company, Canada

Objectives:

1. Assess effects of road use and industrial activity on grizzly bears.
2. Describe activity patterns of grizzly bears.
3. Determine interactions between grizzly and black bears.

Results:

The study of the effects of roads and industrial activity on grizzly bear behavior continued in 1988. A new study was initiated on the interactions between grizzly bears and black bears. The study area is on the Canadian side of the U.S./Canada border, northwest of Glacier National Park. During the 1988 field season, investigators captured grizzly bears and black bears approximately 60 times, replacing old radio collars and fitting new collars to previously uncaptured bears. Radio locations were obtained from aircraft approximately 600 times during the summer. These locations were supplemented with ground locations. Activity recorders were used to monitor signals and record the activity patterns of the collared grizzlies and black bears when they were in close proximity. Manuscripts titled "The Impact of Roads on the Behavior and Habitat Use of Grizzly Bears," "Dynamics of a Grizzly Bear Population During a Period of Resource Extraction," and "A Comparison between Grizzly Bear Harvest Data from Montana and Southeastern British Columbia" were accepted for publication in the Journal of Applied Ecology and the Wildlife Society Bulletin.

Home Range Dynamics, Dispersal, and Reproduction
of Reintroduced Fishers (*Martes pennanti*) in the
Cabinet Mountain Wilderness Area, Montana

Project Leader:	L. Metzgar
Technician:	K. Roy
Cooperators:	Kootenai National Forest, Montana Department of Fish, Wildlife and Parks

Objectives:

1. to restore a viable fisher population to the Cabinet Mountains;
2. to explore the feasibility and mechanisms of fisher reintroduction;
3. to monitor the home range dynamics and dispersal of reintroduced fishers;
4. to determine the initial reproductive success of transplanted fishers; and
5. to investigate the habitat utilization of transplanted fishers in Montana.

Results:

The study was initiated on 1 August 1988. Release points in the Cabinets were determined, and a protocol for obtaining, releasing, and protecting fishers was established. Fieldwork should begin in late October.

Kerr Dam Wildlife Studies

Project Leaders: J. J. Claar and I. J. Ball
Project Biologists: D. Becker, R. Leach, C. Mack, P. Mullen and A. Soukkala
Cooperators: U.S. Bureau of Indian Affairs, Confederated Salish and Kootenai Tribes

Objectives:

1. Determine the effects of the Kerr Project on bald eagles and ospreys
 - a. hunting success,
 - b. feeding site selection,
 - c. food habits, and
 - d. reproduction.
2. Document distribution of furbearer species along the river and lake.
3. Correlate furbearer distribution with riparian vegetation types and other factors.
4. Estimate relative abundance of furbearer species.
5. Determine effects of water level fluctuations on furbearers and habitat.
6. Formulate management and mitigation recommendations necessary to protect and enhance riparian habitat and furbearer population levels.

Results:

Fieldwork is essentially complete. Data analyses and report writing are underway, and will be completed in 1989.



Ecology of Interior Least Terns
and Piping Plovers on the
Lower Platte River, Nebraska

Project Leader: L. Metzgar
Student Investigator: E. Kirsch
Cooperators: Nebraska Game & Parks Commission and USFWS,
Northern Prairie Wildlife Research Center

Objectives:

1. Quantify productivity of resting terns and plovers on sandbar and sandspoil habitats.
2. Determine if habitat and disturbance factors influence productivity.
3. Determine the population status of terns (only) on the lower Platte River.

Results:

The 1987 annual report is complete. Data from the 1988 field season is currently being analyzed.

Six colonies (3 sandbar and 3 sandspoil) are monitored each season from early June until they are abandoned in mid-August. Adults and nests are counted, outcomes of nests recorded, and chicks banded so that productivity can be determined. Habitat features of colonies such as vegetative cover, height, and substrate type are quantified. Numbers of incidences, types of disturbances, and losses due to disturbance are also recorded. The population will be modeled using productivity estimates from 1987, 1988, and 1989 field seasons and adult survivorship data from Bird Banding Laboratory data.

Status and Demography of the Bristle-thighed
Curlew (*Numenius tahitiensis*)

Project Leaders: R. L. Redmond
Cooperators: U.S. Fish and Wildlife Service, Alaska Fish
and Wildlife Research Center and the
Pacific/Hawaiian Islands NWR
Project Biologists: J. S. Marks, D. L. Evans, S. Griffin, and
D. P. Hendricks

Objectives:

1. Assess the species' status.
2. Delimit the species' breeding and staging grounds.
3. Determine the demographics of wintering, staging, and breeding components of the population.
4. Assess potential threats to the species and provide options for sound management based on a statistically reliable monitoring program.

Results:

The Unit is cooperating with the Alaska Fish and Wildlife Research Center in this comprehensive study of bristle-thighed curlews throughout their range and annual cycle. Because our involvement is limited to work outside of Alaska, only these results will be presented below.

During April and May of 1988, field teams were assembled and stationed simultaneously in the Tuamotu Archipelago (Rangiroa Atoll), the Line Islands (Christmas Island), and the Northwestern Hawaiian Islands (Laysan Island) to monitor the spring migration to Alaska. This work confirmed the importance of the Northwestern Hawaiian Islands to migrating curlews. In addition, these islands appear to be the best location to observe and capture large numbers of birds. During a 5-week period in April and May, 119 curlews were captured, measured, and banded on two different islands, Laysan and Lisianski, and much valuable information was learned about the species' migration ecology.

During the fall, two biologists returned to Laysan for 3 months. They continued intensive trapping efforts and instrumented five birds with small radio-transmitters. These birds were located daily to more precisely monitor duration of stop-over and habitat use. In addition, the entire island was surveyed on a regular basis to ascertain how the different habitats were used by curlews at different times of day and in different seasons.



Dorcas Gazelle (*Gazella dorcas*)
Ecology in Morocco

Project Leader: B. W. O'Gara
Student Investigator: C. Loggers
Cooperators: Moroccan Department of Waters and
Forests, Peace Corps, Frankfurt
Zoological Society

Objectives:

1. Document population size and structure, and reproductive rates of dorcas gazelles at the M'Sabih Talaa Reserve near Marrakech, Morocco.
2. Determine the gazelles' feeding habits in relation to availability.
3. Describe the males' territorial activities.
4. Assess current distribution and status of Morocco's wild bovids.

Results:

Reserve population size varied seasonally. Analysis of feces of 10 adult males and 10 adult females suggests gazelles seasonally change food selection. Adult males occupy and defend territories during most and sometimes all of the year. Fieldwork was completed in 1987 and the final thesis is expected near the end of 1989.

Dorcas, Cuvier's (*G. gazella*), and dama (*G. dama*) gazelles and Barbary sheep (*Ammotragus lervia*) all are classified as endangered species. Their Moroccan distributions are fragmented. Dama, desert migrants, have not been officially recorded in Morocco for several years.



CONSERVATION, EDUCATION, AND PUBLIC RELATIONS

Bart O'Gara, Unit Leader

1 October	Reviewed 13-page manuscript for the Wildlife Society Bulletin.
2 October	Met with Forest Service and Montana Department of Fish, Wildlife and Parks (MT FWP) personnel to plan management of Sawmill Gulch to best accommodate wintering elk and recreationists.
5-6 October	Visited Region 6 Office in Denver; meetings with RD and several ARD's. Presented a slide program on "Wildlife management (or lack of it) in China" at Regional Office --attended by approximately 40 USFWS personnel.
7-8 October	Captured pronghorns for National Bison Range.
14 October	Attended meeting of University, MT FWP, and Conservation organization personnel on extension education.
17-22 October	Attended 3rd Eastern Wildlife Damage Control Conference in Gulf Shores, Alabama. Presented paper entitled, "Avoiding controversies that impede wildlife damage control."
23 October	Attended reunion of wildlife alums at University of Montana and reported on the present state of the wildlife program and the Unit.
28 October	Collected and necropsied a mule deer for the Large Mammal Conservation and Wildlife Techniques classes--approximately 10 graduate and 40 undergraduate students.
12 November	Attended a meeting in the School of Forestry to develop a proposal for the Cinnebar Foundation for an extension course on the history and ethics of wildlife management.
16 November	Gave a 3-hour slide program on the carnivores of Montana to the Montana Wildlife class--55 non-wildlife majors.
17 November	Attended Forest Service meeting concerning wildlife/people management in Sawmill Gulch, Montana.
19 November	Lectured for 3 hours on "Identifying Predation Kills" to wildlife techniques class--13 graduate students.

20 November	Provided information to KUFM (University of Montana radio station) on the University's participation in wildlife research and training in Third World countries.
2 December	Gave 4-hour lecture on wildlife livetrapping and drugging to Large Mammal Conservation class--30 students.
3 December	Attended meeting in Univ. Mont. Forestry School concerning Cinnebar Foundation proposal.
11 December	Trapped mountain sheep on Rock Creek for MT FWP.
4 January	Met with Wildlife Federation group concerning logging in the Grant Creek drainage, Montana.
8 January	Gave lecture at Hellgate High School on travel and game management in the Soviet Union--approximately 80 students.
12-14 January	Attended Western District Cooperative Units meeting in Welches, Oregon.
January-March	Taught Wildlife Diseases and Parasites (5 graduate students), co-taught Mammalian Reproduction (6 graduate students), and co-taught Biological Writing (6 graduate students).
5 April	Presented slide show on Asian wildlife to the University of Montana student chapter of The Wildlife Society (40 students).
8 April	Served on panel for The International Wildlife Film Festival, "The wildlife scientist and the film maker."
14 April	Presented a 2-hour lecture to the Wildlife Management Issues class on livestock predation (50 students).
21 April	Presented a slide program at Science Day, Arlington, Va., "Rare and endangered species--a problem of reintroduction" (approximately 100 people attended).
2 May	(On leave.) Lectured on drugging and demonstrated drug delivery systems to 18 faculty and graduate students from National Taiwan and Taiwan Normal universities during a field trip in La La Shan National Park.
5 May	(On leave.) Lectured on wildlife problems and management in Mainland China to about 70 faculty and students at National Taiwan University.

6 May	(On leave.) Lectured on wildlife problems and management in Asia to about 80 faculty and students in Taiwan Normal University.
16 May	Presented an overview of wildlife management and game farming in Asia to about 200 participants in the First International Game Ranching Symposium, Las Cruces, N.M.
30 May-2 June	Attended Pronghorn Antelope Workshop at Hart Mountain National Antelope Refuge, Oregon. Chaired a panel on trapping and transplanting, presented a paper on pronghorn fawn mortality related to limited coyote control on the National Bison Range, and gave a talk on pronghorn mating systems (30 participants).
13 June	Presented a slide program on "Pronghorn biology and behavior" at Region 6 Office in Denver--attended by approximately 40 USFWS personnel.
20 June	Attended Unit Coordinating Committee meetings in Helena.
22 June	Accompanied Region 6 Deputy Director on tour of the National Bison Range, Ninepipes, and the Pablo area, Montana.
30 June	Necropsied a pronghorn for an Upward Bound class of 15 students.
11 July	Presented a 3-hour slide lecture on Montana big game and predator-prey relationships to an Elder Hostel group at University of Montana (35 participants).
12 July	Presented a 3-hour slide lecture on modern China and resource problems to Elder Hostel group at University of Montana (35 participants).
26-30 July	(On leave.) Attended Symposium of Asian-Pacific Mammalogy in Beijing, Peoples Republic of China. Chaired 1 day's session on endangered species, and presented two papers: "Management rather than protection to save China's large mammals" and "Taiwan mammals and conservation concerns," (the latter written by Pei et al.). About 70 participants attended each session.

Joe Ball, Assistant Unit Leader

October-December	Instructed and scheduled 36 undergraduate students for manning MT FWP game check stations.
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1 October	Lectured on waterfowl management to a University of Montana wildlife biology class of 40 undergraduates.
7 October	Helped develop wetland and waterfowl management plan for MT FWP.
14 October	Lectured to University of Montana wildlife biology class of 40 undergraduates on careers in USFWS.
9 November	Gave 2-hour lecture on waterfowl and upland game birds to the Montana Wildlife class--55 non-wildlife majors.
January-March	Taught Bird Conservation and Management class (23 undergraduate students), co-taught Biological Writing (6 graduate students), and co-taught Harvest Principles and Practices (7 graduate students).
12-14 January	Attended Western District Cooperative Units meeting in Welches, Oregon.
18 January	Refereed 19-page manuscript for J. Wildl. Manage.
24-26 January	Attended Winter Waterfowl Conference in Jackson, Miss. Presented two papers: "Winter waterfowl habitat in the northwestern United States," and "Trumpeter swan ecology and management."
29 January	Met with Montana Environmental Quality Committee regarding Wildlife Society input to forest practices planning.
9-11 February	Organized and attended Montana Chapter, The Wildlife Society meeting in Lewistown, Mont.
17 February	Reviewed 75-page manuscript for USFWS Office of Information Transfer.
18-19 February	Briefed (with Ruth Gale, Research Biologist) Region 6 Director and staff on research findings relative to management of trumpeter swans.
10 March	Met with USFWS, UM, and Defenders of Wildlife personnel regarding skunk control in the Flathead Valley.
14 March	Presented a talk on ecology of trumpeter swans to the Five Valleys Chapter of the Audubon Society in Missoula, Mont.; 20 attended.
20-22 March	Attended North American Wildlife and Natural Resources Conference in Louisville, Ky. Presented results of duck recruitment study in northcentral Montana to Central Flyway Council personnel.

28 March	Reviewed a 15-page manuscript for USFWS Office of Information Transfer.
31 March	Lectured on waterfowl management to 30 undergraduate students in Wildlife Biology class.
1 April	Met with USFWS and MT FWS personnel in Kalispell to discuss potential waterfowl habitat development.
11 April	Reviewed 18-page manuscript for North American Wood Duck Symposium.
15 & 23 April	Lectured on research regarding waterfowl nesting to 20 undergraduates in wildlife biology class.
2 May	Reviewed 12-page manuscript for Maine Cooperative Fish and Wildlife Research Unit.
10 May	Spoke to UM Student Chapter, TWS, on ecology and management of trumpeter swans.
13 May	Spoke concerning waterfowl habitat on a Missoula radio program (Station KGVO).
1 June	Refereed 17-page manuscript for J. Wildl. Manage.
20 June	Attended Unit Coordinating Committee meetings in Helena.
30 June	Interviewed on KECI-TV concerning waterfowl populations and drought conditions.
29-30 August	Attended Northwest Section, TWS, meetings in Moscow, Idaho.
16 September	Appeared on local radio show (Station KGVO) to speak on the effect of the current drought on waterfowl.
27, 28, & 29 September	Lectured to UM class, Advanced Wildlife Conservation, and conducted field trip (30 students).

Susan Ball

10 February	Presented paper on mule deer ecology at Montana Chapter, TWS meeting in Lewistown, Mont.
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Steve Gniadek

9 February	Attended Montana Nongame Symposium in Lewistown, Mont; served on panel to discuss federal nongame programs.
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- 10-11 February Attended Montana Chapter, TWS meeting in Lewistown, Mont.
- 18-21 April Attended Peregrin Falcon Monitoring Workshop, Grand Junction, Colo.
- 16 May Attended organizational meeting of the Montana Loon Society in Kalispell, Mont.
- 27 May Attended Technical Committee meeting of the Caribou Recovery Team in Creston, B.C.

Tim Kaminski

- 6 January Attended annual interagency meeting of Bureau of Land Management, U.S. Forest Service, and Oregon Department of Fish and Wildlife in Roseburg. Reviewed findings on diets of spotted owls in Oregon and compared them with those of spotted owls being studied on the Olympic Peninsula, Wash.
- 19-21 April Attended Idaho Chapter, TWS meeting in Coeur d'Alene. Summarized (with K. Foresman) first year's data from Olympic Peninsula spotted owls compared with that from Oregon.
- 15-17 July Taught (with J. Weaver) "Wolves of Yellowstone in Yellowstone National Park." Course sponsored by the Yellowstone Institute in conjunction with Yellowstone National Park.

Eileen Kirsch

- 9 March Presented Zoology Department (UM) seminar, "Ecology of Least Terns and Piping Plovers on the Lower Platte River in Nebraska: Conservation Issues."
- 2 April Attended Northwest Bird and Mammal Society Inland Region meetings. Presented a paper on tern and plover ecology.
- 21 May Attended Nebraska Ornithologist Union annual meetings. Presented paper titled "Least Tern and Piping Plover Ecology on the Lower Platte: Habitat Type and Disturbance Effects on Productivity"
- 30 August Presented Wildlife Department Seminar, Univ. Nebraska, "Ecology of Least Terns and Piping Plovers on the Lower Platte River in Nebraska: Conservation Issues."

Tim Thier

April

Gave a presentation on black bears to the Five Valleys Audubon Chapter in Missoula.

July

Gave an update on the Yaak Country Black Bear Study at the Border Grizzly and Wolf Technical Committee meetings in Polebridge, Mont.

Denise Pengeroth

12 May

Lectured to the freshman class of Hot Spring High School on the skunk removal program in the Flathead Valley, Montana.



Helping agencies trap animals for studies or transplants not only provides a service, it is good experience for University of Montana wildlife students. Proper handling of wild animals is best learned by hands-on experience.

Photo by Steve Brockman

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Overharvest of Canada geese in the Flathead Valley of Montana appeared to be a major management concern in the mid-1950's when these pictures (above and over) were taken. Population levels in the 1980's were generally comparable to the highest levels seen in the early 1950's, but had increased substantially only in local areas where habitat management had increased the number of secure nest sites. Overharvest was apparently not a problem in the 1980's, when one segment of the population was doubled over a 5-year period by increasing the number of secure nest sites.

Photos by John J. Craighead

